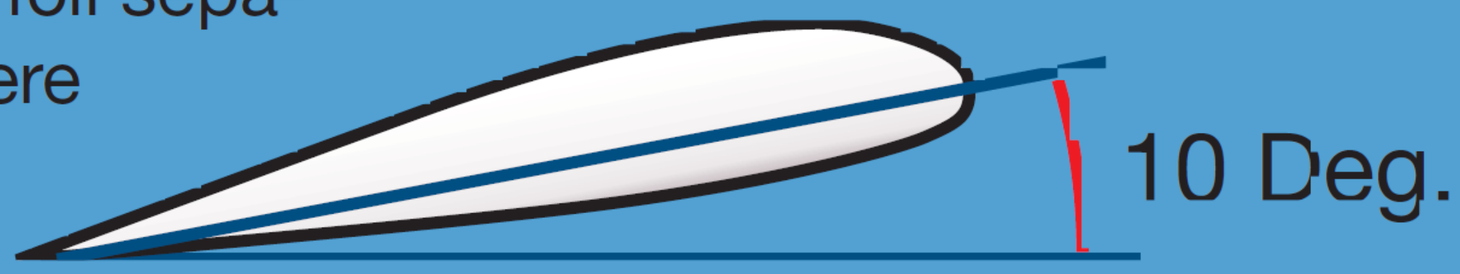
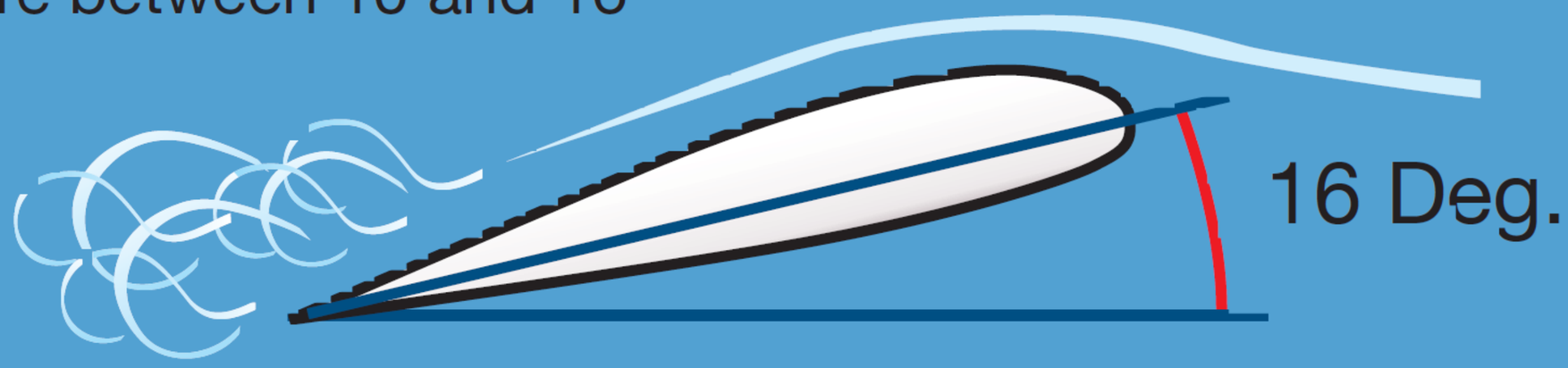
Why Does The Wing Stall?

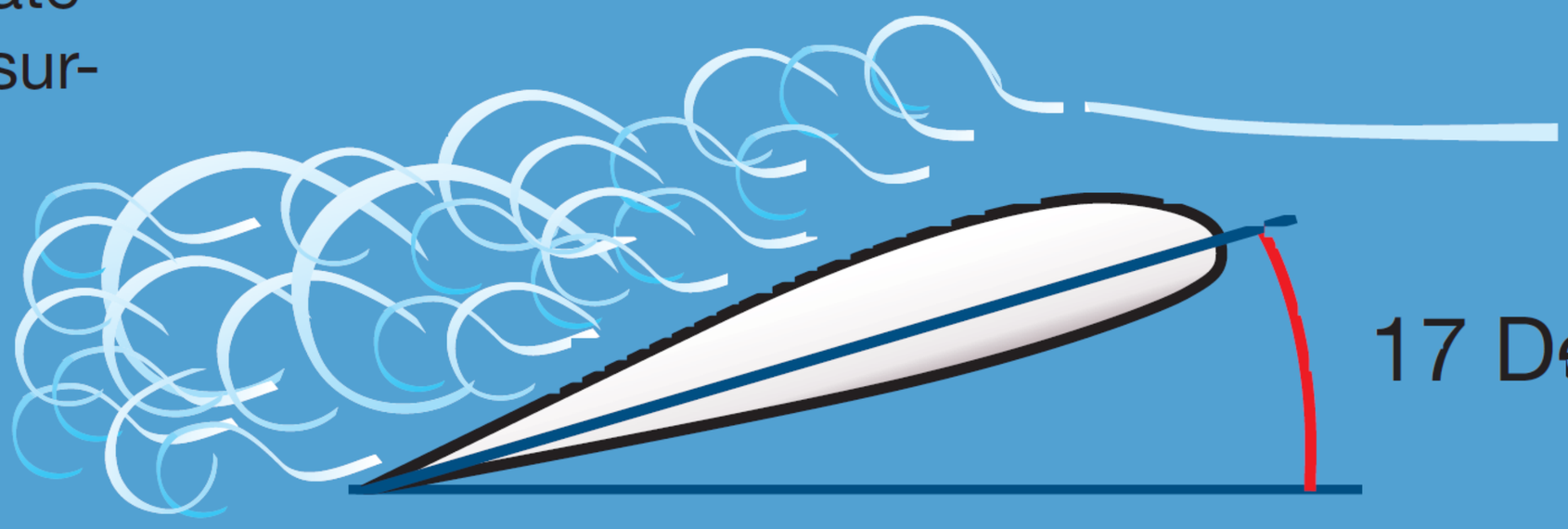
You already should know why a wing stalls, but on the off chance you slept through that portion of your ground-school classes, let's briefly explore the reasons.

The three drawings below depict a basic airfoil at different angles of attack (AoA): low, medium and high. The blue curves above the airfoils represent how air flowing over the airfoil separates, reducing lift; note there is no separation at the lowest AoA.



As the airfoil's AoA increases beyond a certain AoA (depicted here as somewhere between 10 and 16 degrees, but the actual value depends on the airfoil's characteristics) airflow begins to separate from the upper surface. This occurs because the required change in direction for the air to remain attached to the airfoil's upper surface simply is too great. So, the airflow separates and lift deteriorates.





Of course, a couple of caveats apply to these drawings. First, this is a single airfoil section, not a wing. As this article's main text examines, this airfoil section could be at the wing root or tip, with predictable results affecting the airplane's stall characteristics. Second, the AoA at which flow begins to separate and the stall occurs will vary from airfoil to airfoil